GOOSE Messaging over Substation Network

Advances in remote communications have improved the quality and reliability of power distribution infrastructure. Embracing these innovations, utilities have created intelligent substations based on high-capacity 4G LTE, rugged sensors and ethernet switches and intelligent grid hardware such as RTUs, advanced meters and reclosers. The intelligent substation allows utilities to respond to changing loads, manage brownout and blackouts and even contain grid-wide collapse events with real-time remote monitoring and controls.

A large European utility decided to embrace these advances in smart-grid technology, but to build the smart-grid they faced real challenges: they needed to connect thousands of primary substations and hundreds of thousands of secondary substations to a smart-grid data center. This would require remote field communications devices that would fit the needs of their project with industrial wireless 3G or 4G networking.

In this project, the customer faced the following requirements:

- Remote GOOSE Messaging routing between substations

- Multiple Ethernet ports and two serial ports for multiple field devices

- 4G LTE backup to an Ethernet primary connection

- DLMS/COSEM for AMI

- IEC 101 to IEC 104 conversion to support communication between serial field devices and the data center operating with Ethernet.

The solution featured five Ethernet ports and two serial ports, 4G LTE and a robust industrial design – **InHand Networks' InRouter915** exceeded the customer's requirements. Multiple field RTU devices connected to the InRouter915's Ethernet ports to provide the network connection to the remote data center for remote data acquisition and control. To provide intercommunication between smart-meters and the electronic counters (AMM) the IR915 created a virtual serial network between the router's serial port by converting the serial data to Ethernet and routing the data over a secure encrypted tunnel.
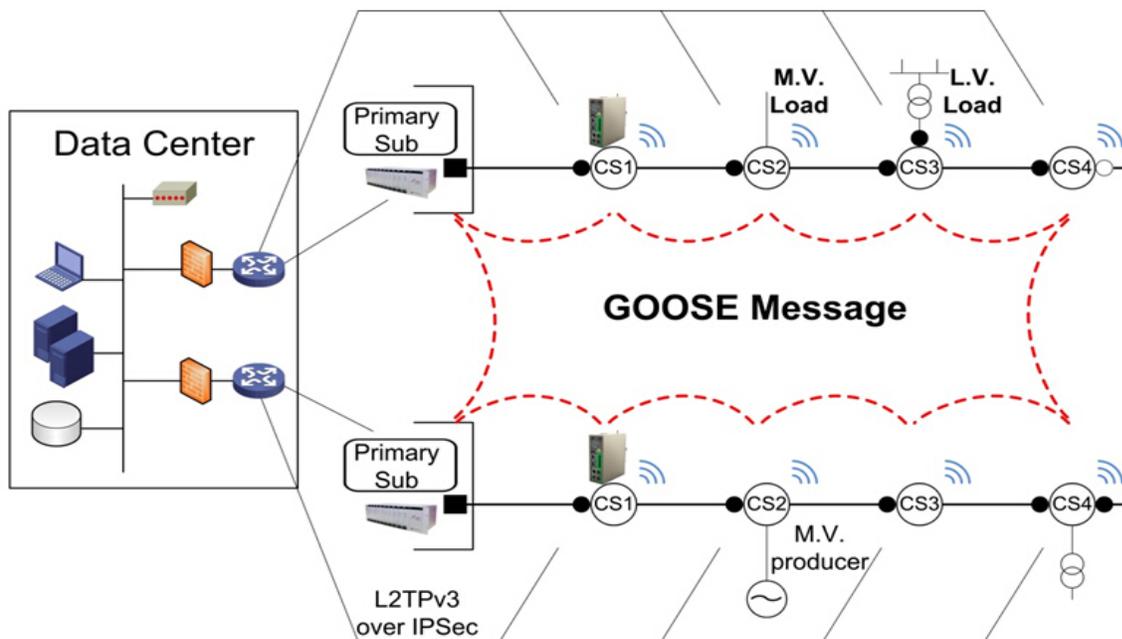
The solutions provided the following advantages:

- L2TPv3 over IPsec enables GOOSE over WAN

- Support for RIP, OSPF, DMVPN for dynamic routing in massive deployments

- Automatic link detection and recovery - two serial ports and five Ethernet ports for multiple field devices

- Real-time monitoring enables higher reliability and lower operating costs